Statement Submitted to the U. S. Department of Energy,
Yucca Mountain Site Characterization Office
North Las Vegas, Nevada
on the

Yucca Mountain Preliminary Site Suitability Evaluation

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*Foreign Affairs*, the world's most influential economic and foreign policy journal, printed an essay titled "The Need for Nuclear Power" in January of 2000. Dr. Richard Rhodes, a Pulitzer-Prize winning historian and journalist, was one of its authors. The essay has been entered in the Congressional Record, it has been widely cited in national and international publications, and it is used as a reference for decisions by the Nuclear Regulatory Commission. I am the second author of that essay. I will attach an annotated copy to my written statement for entry in the official record because it highlights the need for and worldwide environmental and health benefits of nuclear power, which places the need for these hearings in context with national and global energy needs.

The need for additional electricity supply was recently highlighted by an analysis of a report from the United Nations. Dr. Alan Pasternak of the University of California correlated the UN's Human Development Index with per capita electricity use for 95% of the world's population. A low value of this index, which is found for most of the world's population, is associated with poor human conditions: illiteracy, poverty, poor health, and early death. His correlation shows that human health and well being depend on electricity, and that the current alternative is worldwide suffering.

For most of the people in the world, with minimal access to electricity, the Index increases rapidly with small increases of electricity supply, yet the average citizen of these nations can expect to die ten to twenty-five years earlier than you and I. Thus, the global lack of electricity means billions of people die decades before they should. We can conclude from Dr.

Pasternak's analysis that poverty is thousands of times more dangerous than explosions of natural gas, spills of oil, emissions from coal plants, or nuclear waste.

Most practical people now understand that the less-fortunate peoples of the world must and will increase their electricity usage. The suppliers of that energy—and governments—will determine its impact on the economy and the environment. During the last decade, under deregulation, the U.S. nuclear industry has increasingly demonstrated that it is the cleanest, safest, and most environmental **major source** of electricity. It is also affordable, reliable, and sustainable. These six attributes—clean, affordable, reliable, environmental, safe, and sustainable—make up the acronym CARESS. Because these attributes characterize today's U.S. nuclear power industry, national leaders, the press, Wall Street, and business leaders widely recognize that we are in the midst of a renaissance. That is why Vice President Dick Cheney's energy studies group chose to CARESS nuclear power in its report.

Recent publicity in the national press also tells us about the U.S. industry's plans for the addition of new capacity. First, the operating "lifetimes" of reactors are being extended, taking existing U.S. nuclear power beyond the middle of this century. In addition, most nuclear reactors will increase capacity equivalent to building ten new nuclear plants. These two actions alone will increase the generation of used nuclear fuel from existing reactors by more than fifty percent.

The highly consolidated, privatized and de-regulated nuclear power industry is already making plans to begin construction beginning in about 2005: to add another 50,000 MW of new capacity at existing plants by 2020, and to build even more through at least 2050. With sixty-year lifetimes, the newest of these reactors will still be operating, and generating used nuclear fuel, more than a hundred years from now.

But who will design, build, and operate this new generation of nuclear power plants that we need today? Recent reports, such as in Business Week and the Christian Science Monitor, have detailed a severe shortage of college graduates for the existing nuclear power industry because of a precipitous decline in the infrastructure for educating nuclear scientists and engineers. A year ago undergraduate and graduate nuclear-engineering student populations were the lowest in more than three decades.

We also need new nuclear scientists, engineers, and facilities for monitoring the activities of other nations and terrorist organizations, for stopping the proliferation of nuclear weapons, for conducting nuclear R&D, and for industrial applications.

In addition to this infrastructure challenge for the next two decades, the emerging global nuclear renaissance presents us with the challenge of greatly increased generation of used nuclear fuel. The result of the renaissance that I described, without a new management philosophy, is in excess of 120 thousand tonnes of used nuclear fuel by 2030 in the U.S. alone, and millions of tons globally by the middle of this Century. But students, faculty, and research scientists at the University of Nevada Las Vegas are already investigating a new technology and a different philosophy for the management of this valuable material. With the support of Senator Harry Reid to provide funding from the U.S. DOE, UNLV has begun research on accelerator-driven transmutation, a process of causing additional nuclear reactions in long-lived radioactive materials to turn them into short-lived or non-radioactive isotopes.

The three topics that I discussed today--the need for nuclear power, the need for revitalizing our nuclear infrastructure, and the need for a national management capability for nuclear waste that will be created during the nuclear renaissance--offer the state of Nevada a unique opportunity. We must note that a national repository for high-level radioactive waste is a key element of that management capability for any nuclear energy future.

Southern Nevada, led by the University in Las Vegas, can take this opportunity to become **the world leader** in insuring the safe, economical, and environmental management of used nuclear fuel. Nevada can create a new national nuclear science center: a national center of excellence for repository science, for recycling used nuclear fuel, for reusing this valuable resource, and for reducing the amount of waste that needs disposal as well as the radio-toxicity of that waste. We can create the science and technology necessary for recycling uranium, higher actinides like neptunium and plutonium, and other radioisotopes. We can reuse, rather than discard, the transuranium isotopes by extracting more vital electricity from the nuclear fuels. We can use other isotopes to conduct nuclear medical research in Nevada universities and to diagnose and treat diseases like osteoporosis and cancer in Nevada hospitals, and we can use other isotopes for an ever-expanding array of industrial radiation applications. These industrial applications include manufacturing, oil and gas exploration, irradiation to sterilize hundreds of

consumer products and most medical equipment, and irradiation of food as well as livestock feed to eliminate pathogens like Listeria, Hoof-and-mouth, and e-Coli. Simultaneously with this recycling and reuse of nuclear materials, we can reduce the toxicity and the volume of waste, as well as quantities of materials that could be used for proliferation of nuclear weapons centuries or millennia from now. Reduce, reuse, recycle.

In conclusion, the citizens of Nevada are in a position to take the fullest advantage of this opportunity, to create a national center of excellence for management of this material, to reduce its legacy for our descendants, and to reduce its impact on the environment—all funded by the federal government.

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